

Control of divertor heat flux by Radiative Divertor operation in DIII-D

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The DIII-D tokamak divertor program is focused on obtaining the physics understanding of the divertor and scrape-off layer plasma required for learning how to control divertor energy and particle flux in future large tokamaks such as ITER. We have made significant progress, reducing peak divertor heat flux by a factor of 5. This is done using deuterium or impurity gas puffing, which increases divertor density and radiative loss. Thomson Scattering measurements in 2-D have shown that the electron temperature is reduced from more than 100 eV at the upstream separatrix to less than 1 eV near the divertor plate. We are now correlating this and simultaneous data from an extensive diagnostic set including fixed and fast-plunging Langmuir probes, VUV spectrometers, bolometers, visible-light TV cameras, and infrared cameras, with predictions from a 2D fluid code. In this low-temperature regime, atomic and molecular physics must now be added to improve our understanding. In addition, we are working toward independent control of core and divertor plasma.

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